Integrating the biological and physical components of maize pollen dispersal

Mark Westgate, Ray Arritt, and Susana Goggi. Iowa State University

As an open pollinated crop, corn is predisposed to out-crossing, i.e. fertilization by pollen shed from other corn plants rather than by self-pollination. This reproductive characteristic conflicts with the need to control genetic purity of harvested seeds and limit pollen drift from transgenic sources. Assessing the risk of out-crossing events must consider the complex interactions between the biology of the flowering and pollination processes as well as the physical nature of pollen transport in the atmosphere. Our research team is developing quantitative biological models of pollen production, physical atmospheric models for pollen movement, and genetic determinants of pollen-silk interactions to assess this risk under typical field conditions. We are combining these biological, physical, and molecular models to quantify pollen production in a given field, determine where it travels outside that field, and establish the risk of an out-cross event in a field nearby. The results of this research effort are aimed at providing a scientific basis for sound policy decisions to enable producers of both transgenic and non-transgenic corn seed to achieve their marketing objectives, and minimize risk of unintended off-site pollination events.